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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,192	12/15/2003	Vidya Pundalik Kamath	131037-1/YOD GERD:0070	4365
7590 Patrick S. Yoder FLETCHER YODER P.O. Box 692289 Houston, TX 77269-2289			EXAMINER ALLISON, ANDRAE S	
			ART UNIT	PAPER NUMBER
			2624	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/736,192

Applicant(s)

KAMATH ET AL.

Examiner

Andrae S. Allison

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 December 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 3/15/2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, 14-15, 16-20 and 26-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Giger et al (US Patent No.: 5,984,870).

As to claim independent claim 1, Giger discloses an automated method for determining a plurality of characteristics of a breast lesion (method for computerized analysis of lesions, column 1, lines 15-17), the method comprising: automatically identifying a region of interest in an image (determine initial location of the lesion, column 4, lines 45-46 ), the region of interest comprising the breast lesion; preprocessing the region of interest to enhance a quality of the image (image data pass through FFT circuit, column 11, lines 14-15); automatically segmenting the breast lesion in the region of interest (extract lesion from image, column 4, lines 50-51); automatically measuring a plurality of measurements for determining the plurality of characteristics of the breast lesion (image data is passed through texture measuring circuit, column 11, lines 16-17); and automatically classifying the breast lesion as benign or malignant based on the plurality of measurements (classify lesion as benign or cancerous based

on output from a classifier, column 4, lines 55-62).

As to independent claim 15, this claim differs from claim 1 only in that claim 15 is system whereas, claim 1 is method and the limitations memory unit and processor are additively recited. Giger clearly teaches a system comprising: a memory unit (1009, see Fig 15); and at least one processor (290, see Fig 16).

As to independent claim 26, all the limitations are discussed above except "computer-readable medium storing computer instructions for instructing a computer system to determining a plurality of characteristics of a breast lesion." Giger teaches computer-readable medium (1009, memory unit, see Fig 15) storing computer instructions (software; column 11, lines 45-46) for instructing a computer system to determining a plurality of characteristics of a breast lesion.

As to independent claim 27, Giger teaches a system (see Fig 15) for determining a plurality of characteristics of a breast lesion, the system comprising: the means for automatically identifying a region of interest in an image, the region of interest comprising the breast lesion is the lesion location circuit (see Fig 15); the means for preprocessing the region of interest to enhance a quality of the image is the FFT circuit (see Fig 15); the means for automatically segmenting the breast lesion in the region of interest is feature extraction circuit (see Fig 15); the means for automatically measuring a plurality of measurements for determining the plurality of characteristics of the breast

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lesion is the shape circuit; and the means for automatically classifying the breast lesion as benign or malignant based on the plurality of measurements is the classifier circuit (see Fig 15).

As to claim 2, Giger teaches the method, wherein the automatically measuring step comprises measuring a shape of the breast lesion based on a plurality of shape measurements (column 7, lines 6-7).

As to claim 3, Giger teaches the method, wherein the plurality of shape measurements comprises a plurality of margin characteristics (see column 7, lines 5-7, where the shape a lesion is calculate based on its long-to-short axis ratio from the margin).

As to claim 4, Giger teaches the method, wherein the plurality of shape measurements includes regularity of a boundary of the lesion and a plurality of margin characteristics (see column 7, lines 5-16 where the long-to-short axis ratio from the margin and the irregularity of a lesion is calculated).

As to claim 5, Giger teaches the method, wherein the classification of the lesion comprises a rule based system, the rule based system applying a plurality of pre-determined rules on the plurality of characteristics to indicate the condition of the lesion (see column 8, lines 38-62, where a classifier uses a plurality of features extracted from

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a lesion to indicate the condition of the lesion).

As to claim 6, Giger teaches the method, wherein the plurality of pre-determined rules include a tall wide ratio (long-to-short axis ratio; column 8, line 6-7), posterior echo enhancement (see Fig 7B), posterior shadow (see Fig 7A), and regularity measure (irregularity measure, column 8, line 14).

As to claim 14, Giger teaches the method, wherein the image is generated by an ultrasound system (column 8, line 56).

Claims 16-20 differ from claims 2-6 only in that claims 2-6 are method claims whereas, claims 16-20 are system claims. Thus, claims 16-20 are analyzed as previously discussed with respect to claims 2-6 above.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 7-10 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giger et al (US Patent No.: 5,984,870) in view of Kuhn (US Patent No.: 5,982,916).

As to claim 7, Giger does not expressly disclose the method, wherein the automatically segmenting step comprises generating a three-dimensional plot of the image; wherein the three-dimensional plot comprises a plurality of hills and valleys determined based upon a threshold value. Kuhn discloses a method for automatically locating a region of interest in an image (column 1, lines 7-8) that includes wherein the automatically segmenting step comprises generating a three-dimensional plot of the image; wherein the three-dimensional plot comprises a plurality of hills and valleys determined based upon a threshold value (see column 7, lines 23-37 and column 8, lines 43-60, where a histogram is created from the image data and the minimum and maximum intensity values are calculated based on a threshold value). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have combined the teachings of Giger and Kuhn for locating a region of interest in a digitized mammogram of a breast image by forming an histogram of the image data and determining the local minima and maxima.

As to claim 8, Kuhn teaches the method, further comprising slicing a topology of the three-dimensional plot at the threshold value (column 5, lines 21-23).

As to claim 9, note the discussion above, Kuhn teaches the method of, further

comprising processing the three-dimensional plot to estimate the region of interest in the image (column 4, lines 16-17).

As to claim 10, note the discussion above, Kuhn teaches the method, wherein the identifying step comprises applying an inverted trough method to identify the region of interest (see column 2, lines 65-67, where a minimum intensity value is used to identify a region of interest).

Claims 21-24 differ from claims 7-10 only in that claims 7-10 are method claims whereas, claims 21-24 are system claims. Thus, claims 21-24 are analyzed as previously discussed with respect to claims 7-10 above.

5. Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giger et al (US Patent No.: 5,984,870) in view of Gaborski et al(US Patent No.: 5,857,030).

As to claim 11, Giger does not expressly disclose the method, wherein the preprocessing step comprises using an edge preserving smoothing filters. Gaborski discloses a method for processing radiological images that includes wherein the preprocessing step comprises using an edge preserving smoothing filters (column 3; lines 31- 46). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have combined the teachings of Giger and Gaborski for digital imaging processing of mammograms utilizing artificial neural network for detection of



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micro calcification clusters by using a multi-step process to eliminate false positive before final classification (column 1, lines 10-12 and column 2, lines 8-12).

As to claim 13, note the discussion above, Gaborski teaches the method, further comprising applying a multi-scale morphology technique to remove speckles from the region of interest (column 4, lines 30-56).

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Giger et al (US Patent No.: 5,984,870) in view of Li et al (US Patent No.: 6,654,728).

As to claim 12, Giger does not expressly disclose the method, further comprising applying a fuzzy enhancement technique to distinguish between a brighter region and a darker region. Li discloses a method for digital processing of radiological images that includes applying a fuzzy enhancement technique to distinguish between a brighter region and a darker region (see column 4, lines 5-15, where fuzzy logic is used to identify and classify of masses and tumors). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have combined the teachings of Giger and Li for the identification and classification of micro- calcification clusters or masses in breast cancer using ultrasound images (column 39-50).

### ***Conclusion***

The prior art made part of the record and not relied upon is considered pertinent to applicant's disclosure.

Jang (US Patent No.: 5,268,967) is cited to teach an automated method for segmenting desired regions in a digital radiograph image.

Nishikawa et al (US Patent No.: 5,537,485) is cited to teach a computerized detection of clustered micro-calcifications in digital mammograms.

Collins et al (US Patent No.: 6,801,645) is cited to teach a computer aided detection method and system to assist radiologists in the reading of medical images.

Stafford (US Patent No.: 5,331,550) is cited to teach a method for computer aided detection of anomalies in an image.

Rogers et al (US Patent No.: 6,205,236) is cited to teach a method and system for detecting and displaying clustered micro-calcification in a digital mammogram.

Cheng et al (NPL document titled: "Automated Detection of Breast Tumors in Ultrasonic Images Using Fuzzy Reasoning") is cited to teach a method for the automated detection of breast tumors in three-dimensional ultrasonic images using fuzzy reasoning.

Lucht et al (NPL document titled: "Neural network-based segmentation of dynamic MR mammographic images") is cited to teach method of using neural network for the classification of signal-time curves from dynamic MR mammography.

Abdolmaleki et al (NPL Document titled: "Feature extraction and Classification of breast cancer on dynamic magnetic resonance imaging using artificial neural network") is cited to teach a system to extract and analyze the quantitative data from time-intensity profile.

Zheng et al (NPL Document titled: "An Artificial Intelligent Algorithm for Tumor Detection in Screening Mammogram") is cited to teach an algorithm that combines several artificial intelligent techniques with the discrete wavelet transform (DWT) for detection of masses in mammograms.

### ***Inquires***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrae S. Allison whose telephone number is (571) 270-1052. The examiner can normally be reached on Monday-Friday, 8:00 am - 5:00 pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrae Allison

February 12, 2007

A.A.



JOSEPH MANCUSO  
SUPERVISORY PATENT EXAMINER